

Lean Principles and Accounting

Appendix D

Wild and Shaw
Fundamental Accounting
Principles
25th Edition

Appendix D Learning Objectives

CONCEPTUAL

C1 Describe lean principles.

ANALYTICAL

A1 Compute cycle time and cycle efficiency, and explain their importance to production management.

A2 Compute days' sales in work in process inventory.

A3 Compute days' payable outstanding.

PROCEDURAL

P1 Record product costs using lean accounting.

P2 Classify quality costs and prepare a cost of quality report.

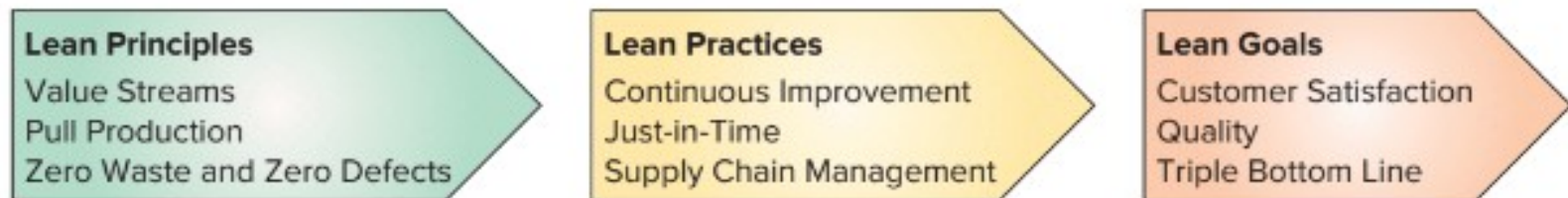
Learning Objective C1

Describe lean principles.

Lean Business Model

Goals are to use fewer resources to deliver higher quality products to satisfy customers.

Exhibit
D.1



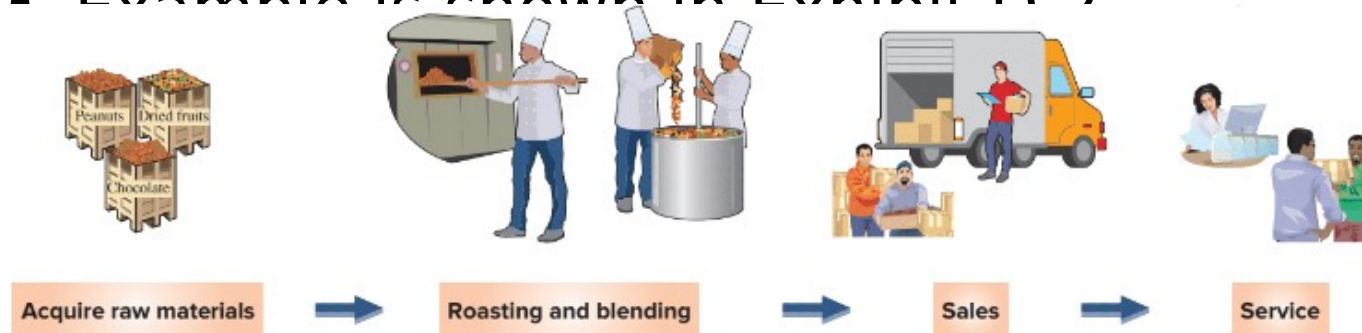
Learning Objective C1: Describe lean principles.

Value Streams

Value streams

- Lean manufacturers use smaller value streams.
- Consist of all activities needed to create customer value.
- Example is shown in Exhibit D.2

Exhibit
D.2



Learning Objective C1: Describe lean principles.

Pull Production

Pull production used by lean manufacturers:

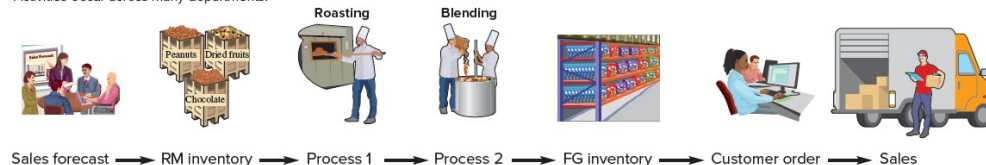
- Begins with a customer order
- Goods are pulled through manufacturing just-in-time

Push production used by traditional manufacturers:

- Goods produced before customer order
- Goods are pushed into inventory and wait for order

Push (Traditional) Production

Activities occur across many departments.



Pull (Lean) Production

All activities occur in one value stream.

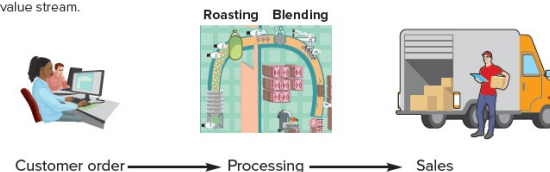


Exhibit
D.3

Learning Objective C1: Describe lean principles.

Cycle Time₁

Cycle time is the total time a production process takes.

- Aim is to reduce cycle time by producing smaller batch sizes and making goods to customer order.
- Focuses on improving components to reduce cycle time:
 - Process time (value added) – time working on and producing product.
 - Inspection time (non-value added) – time spent inspecting raw materials, work in process, and finished goods before shipment.
 - Move time (non-value added) – time spent moving materials, inventory, and employees moving in production area.
 - Wait time (non-value added) time an order sits before or between production processes.

Setup Time is the time to prepare a process for production

Inventory	Traditional Approach	Lean (Just-in-Time) Approach
Raw materials	Bought to hold in inventory; enters production based on sales forecast.	Bought after a customer order; enters production immediately after receipt.
Work in process	Larger; not a priority to reduce.	Reduced as cycle times get faster.
Finished goods	Held in inventory until sold.	Delivered to customers after goods are finished.

Zero Waste and Defects

Zero waste and zero defects

- Aim for zero waste and zero defects.
- Employees can stop production if something is wrong.
- Defective goods not passed to next process.
- Fewer defects lead to lower scrap, rework costs, warranty claims, and increased customer satisfaction.

Lean Production Example

Exhibit
D.4

	Traditional Approach	Lean Approach	Benefits from Lean Approach
Production layout	Sewing, ironing, and packing processes are Physically separated.	All processes in the apparel value stream are located together.	Reduced move time of both employees and inventory.
Production starts with	Sales forecast.	Customer order.	Less inventory.
Quality control	End-of-line quality inspection.	Each employee inspects her own output before passing it to the next step.	Fewer defects.
Supervision	One supervisor for each process	One supervisor for the entire value	Reduced overhead costs

Lean Overhead Costs

- Traditional manufacturers use methods like activity-based costing to allocate overhead costs to products.
- Lean manufacturers aim to eliminate overhead costs, not allocate them.
- Table below shows changes that reduce overhead costs.

Operational Change to Produce in Value Streams	Reduced Overhead Costs
Eliminate supervisors	Eliminate supervisor salaries and benefits.
Eliminate support departments	Costs of quality control, purchasing, customer service, design, maintenance, and scheduling are reduced and directly traced to each value stream.
Implement just-in-time to eliminate central warehouse	Costs of moving, storing, and controlling inventory are reduced and directly traced to each value stream.

Supply Chain Management

- Also called logistics, controls materials, information, and finances as they move between suppliers, manufacturers, and customers.
- Supply chain management ensures raw materials arrive just-in-time for production.
- Just-in-time ensures that customers receive their orders on schedule.

Lean Processes for Service Businesses

- Lean principles also apply to retailers and service businesses.
- Aim is to reduce the number of defective products sold and increase customer satisfaction.

Learning Objective A1

Compute cycle time and cycle efficiency, and explain their importance to production management.

Cycle Time₂

Cycle time – time to produce a good or provide a service.

Exhibit
D.5

Cycle time = Process time + Inspection time + Move time + Wait time

Learning Objective A1: Compute cycle time and cycle efficiency, and explain their importance to production management.

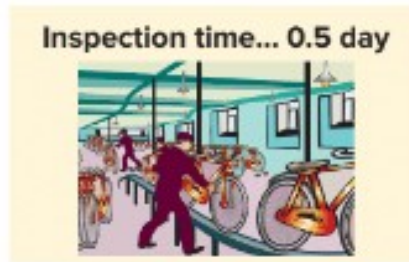
Cycle Efficiency

Cycle efficiency – measure the amount of cycle time spent on value-added activities.

- Value-added time / Cycle time

$$\text{Cycle efficiency} = \frac{\text{Value-added time}}{\text{Cycle time}}$$

Exhibit
D.6



Learning Objective A1: Compute cycle time and cycle efficiency, and explain their importance to production management.

Learning Objective A2

Compute days' sales in
work in process
inventory.

Days' Sales in Work in Process Inventory

- Getting products to customers sooner by reducing work in process inventory can increase customer satisfaction.
- To measure production efficiency, we can use days' sales in work in process inventory.
- Lower days' sales in work in process inventory means the company is completing its production cycle more quickly.

$$\text{Days' sales in work in process inventory} = \frac{\$503}{\$45,829} \times 365 = 4 \text{ days}$$

$$\text{Days' sales in work in process inventory} = \frac{\text{Work in process inventory}}{\text{Cost of goods sold}} \times 365$$

Exhibit
D.7

Learning Objective A2: Compute days' sales in work in process inventory.

Learning Objective P1

Record product costs
using lean accounting.

Key Accounts

- Work in process inventory – raw materials put into production immediately – no separate raw materials account needed. Raw materials purchases are recorded in Work in Process Inventory.
- Conversion Costs – direct labor, indirect labor, and other overhead costs.

$$\text{Conversion cost rate} = \frac{\text{Budgeted conversion costs}}{\text{Budgeted production hours}} = \frac{\$100,000}{4,000 \text{ hours}} = \$25 \text{ per production hour}$$

Accounting Entries

Relevant journal entries of a lean business below show:

- Purchase of raw materials
- Applied conversion costs
- Actual conversion costs
- Sale and recording of cost of goods sold

□	Work in Process Inventory.	8,000	
	Accounts Payable		8,000
	<i>Acquired raw materials on credit (200 units × \$40).</i>		
□	Work in Process Inventory	32,000	
	Conversion Costs		32,000
	<i>Apply conversion costs to production (200 units × \$160).</i>		
□	Conversion Costs	32,000	
	Various Accounts		32,000

□	Accounts Receivable	96,000	
	Sales		96,000
	<i>Record sales on credit (200 units × \$480).</i>		
□	Cost of Goods Sold.	40,000	
	Work in Process Inventory		40,000
	<i>Record cost of goods sold (200 × \$200).</i>		

Accounting Entries when Finished Goods Inventory Remains

When Finished Goods Inventory Remains:

- Finished Goods Inventory is increased for cost of goods not sold.
- Assume that in example previously shown, fewer units are sold leaving 15 units in ending inventory.
- Journal entries 1-3 are recorded as previously, but business will have two additional entries as follows:

□	Accounts Receivable	88,800	
		0	
	Sales		88,800
			0
	<i>Record sales on credit (185 units × \$480 selling price).</i>		

□	Finished Goods Inventory	3,000	
	Cost of Goods Sold	37,000	
		0	
	Work in Process Inventory		40,000
			0
	<i>Record inventory and cost of goods sold.</i>		

Learning Objective P1: Record product costs using lean accounting.

Learning Objective P2

Classify quality costs and
prepare a cost of quality
report.

Costs of Quality

Cost of Good Quality:

- Prevention activities – focus on quality training and improvement programs.
- Appraisal activities – inspections to ensure materials and supplies meet specifications.

Costs of Poor Quality:

- Internal failure – incurred after a company has manufactured a defective product but before delivery to customer.
- External failure – incurred after customer has been provided a defective product or service.

Exhibit D.8

Costs of Good Quality



Prevention costs

Costs of Poor Quality



Internal failure costs



Appraisal costs



External failure costs

Learning Objective P2: Classify quality costs and prepare a cost of quality report.

Costs of Quality Report

Exhibit
D.9

Cost of Quality Report			
Quality Category	Cost	Category Total	% of Total Cost of Quality
Prevention			
Training	<u>\$25,000</u>	\$25,000	25%
Appraisal			
Inspecting materials	17,500		
Testing finished goods	<u>12,500</u>	30,000	30%
Internal failure			
Rework	8,400		
Scrap	<u>7,600</u>	16,000	16%
External failure			
Warranty claims	18,200		
Product recalls	<u>10,800</u>	<u>29,000</u>	<u>29%</u>
Total cost of quality		<u>\$100,000</u>	<u>100%</u>

Learning Objective A3

Compute days' payable
outstanding

Days' Payable Outstanding

- Measure of how long a company takes to pay its creditors.
- Usually rounded to the nearest whole day.
- Taking too long to pay could harm their partnership.
- Paying too soon means company has less cash available.

$$\text{Day's payable outstanding} = \frac{\text{Accounts payable}}{\text{Cost of goods sold}} \times 365$$

Exhibit
D.11

Company	\$ millions	Current Year	One Year Prior	Two Years Prior
Nike	Accounts payable	\$ 2,612	\$ 2,279	\$ 2,048
	Cost of goods sold	\$21,643	\$20,441	\$19,038
	Days' payable outstanding	44 days	41 days	39 days
Under Armour	Days' payable outstanding	81 days	72 days	75 days

Exhibit
D.12

Learning Objective A3: Compute days' payable outstanding.

End of Appendix D